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- I. *A Letter from his Excellency Nicolas-Michael d'Aragona, Prince of Cassano, and F. R. S. to the President of the ROYAL SOCIETY, containing an Account of the Eruption of Vesuvius in May 1737. Translated from the Italian by T. S. M. D. F. R. S.*

S I R,

AS your extraordinary Talents, and excellent Taste, in a true Examination of Natural Effects, and in Discoveries relating to Experimental Philosophy, are so well known, that you have, with Justice, been elected into the most celebrated Academies of *Europe*, and to the Presidentship of the ROYAL SOCIETY of *London* in particular; I resolved, with good Reason, to offer you a short Account of the last great, dreadful and pernicious Eruption of our *Vesuvius*; to the End that, if you are pleased to investigate the Causes thereof, the Republic of Letters might reap some general Advantage, as it does daily, by means of its Members of the first Rank in Merit.

Mount *Vesuvius* is generally esteem'd about seven Miles distant from *Naples*. It rises in the Middle of a large Plain, which surrounds it on every Side. It is better than four Miles from the Sea; and the Foot of the Mountain is seen to begin from the Sea-Coast, which growing gradually higher, reaches the first Plain, to which one can easily ride on Horseback. The Figure of the Plain is almost circular, being about five Miles in Diameter, and half a Mile

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perpendicular Height above the Level of the Sea. This is the Basis of the Mountain, out of which arises another, called by the People of the Country *Monte-vecchio*, whose perpendicular Height is about four hundred Paces, and its Top little less than two Miles in Circumference, of an irregular Figure. The said Top, before the Year 1631. was of the Form of a Bason, but all surrounded with aged Oaks, and vastly large Chestnut-trees, whose Fruit afforded Food sufficient for a Number of Cattle that fed thereon. In the Bottom a Cavern was observed, into which People descended above two hundred Paces, by difficult and interrupted Paths; and this Opening was looked upon as the antient Mouth, which for a long Space of Time had constantly cast up great Quantities of bituminous Matter, and had at the same time burnt a considerable Part of the neighbouring Country, cultivated by the Inhabitants round the Hill.

Concerning the Eruptions that have happened heretofore, they are very numerous, as well antient as modern.

Of the first, several are taken Notice of by *Berosus Chaldaeus*, *Polybius*, *Strabo* in the time of *Augustus*, *Diodorus*, and *Vitruvius*; and in *Trajan's* Reign the Name of the Mountain became more famous by the Death of *Pliny*. From that time forward, 'tis not doubted, that the Eruptions were less frequent down to the Year 1139; when, after a considerable Eruption, it began to take Rest, and continued quiet somewhat less than five Centuries; so that the horrid Remembrance of the past Ruins was pretty well obliterated out of the Minds of the neigh-

neighbouring Inhabitants; who, vainly flattering themselves with Hopes, that the inflammable Matter was spent, planted the whole District round the Mountain, which, by its Fertility, became the Delight of these Parts. But, in Process of Time, they found themselves deceived and frustrated in their Expectations: For in the Year 1631. during six Months Space, continual Rumbings were heard, and Shocks of Earthquakes felt: And afterwards, in the Month of *December*, a dreadful fiery Eruption happen'd, which first blew up Part of the Mountain into the Air, in a terrible Manner, and then vomited out Water, Ashes, Stones and Fire; inundating almost the whole Country around, to the Sea, and for above seven Miles in Breadth, with the irreparable Loss of more than four thousand People. After which the Mountain became silent, and remain'd considerably diminish'd in its Height, from what it had been before.

It continued quiet for twenty-nine Years; but having rekindled in 1660. its Fire fill'd the whole Capacity of the immense Hollow, which remain'd since the Year 1631; whence, after several lesser Eruptions, a new Mountain appear'd in 1685.

In 1707. not only the Inhabitants of the Neighbourhood, but also the whole City of *Naples*, were put into great Terror, and not without Reason, by the Apprehensions of a Renewal of the dismal Tragedy of 1631. upon account of the frequent Noise and Shocks, the Fire seen on the Top of the Mountain, with a vast Quantity of Ashes, which issuing out with Impetuosity, were dispersed all over our Hemisphere, and darken'd the Light of the Sun for one

whole Day's Space. These were all manifest Signs of the impending Desolation : and yet (whether by a Miracle of our particular Protector St. *Januarius*, as some were of Opinion, or by natural Causes) this dreadful Day, which had portended so much Mischief, was beyond Expectation, and to our great Astonishment, follow'd by another as pleasant as could be desired : for the Air was quite serene, and clear of the Ashes ; and on the Mountain there was no other Appearance but that of a little Smoke.

In the Year 1724. the Quantity of Ashes and Stones, thrown from the Top of the Mountain, were so heaped from the Bottom up to the Edge of the old Mountain, that the whole Space from the old Hill to the new, appeared but one continued Mountain.

In 1730. there was another Eruption of *Vesuvius*, which, though very inconsiderable in respect of the last, yet was the Occasion of much Fear.

This present Year 1737, to the Month of *May*, the Mountain was never quiet : Sometimes emitting great Quantities of Smoak, at other times red-hot Stones ; which, for want of a sufficient impelling Force, fell on the same Mountain. But in order to a clear Idea of all the Circumstances presaging the impending Eruption, 'tis requisite to know, that in the Beginning of *May*, a Smoak only was seen to issue from the open Mouth at the Top ; and from the 16th to the 19th, subterraneous rumbling Noises were heard.

On the 19th, Fire was seen to burst out in thick black Clouds ; and the same Day there were several loud Reports, returning quicker towards the Evening :

ing: And still more on *Sunday* Night, when there constantly appear'd a very great Smoak mix'd with Ashes and Stones; and the Neighbourhood felt some Shocks, like those of a weak Earthquake.

On *Monday* the 20th, at the 13th Hour, the Mountain made so loud an Explosion, that the Shock was strongly felt not only in the Neighbourhood, but also in the Cities twelve Miles round. Black Smoak, intermixt with Ashes, was seen suddenly to rise in vast curling Globes; which spread wider, as it moved farther from the Basen. The Explosions continued very loud and frequent all this Day, shooting up very large Stones through the thick Smoak and Ashes, about a Mile high, to the Horror of the Beholders, and Danger of all the neighbouring Buildings.

At the 24th Hour of the same *Monday* 20th of *May*, amidst the Noise, and dreadful Shocks, the Mountain burst on the first Plain, a Mile distant obliquely from the Summit, and there issued from the new Opening a vast large Torrent of Fire; whence, by the Quantity of Fire incessantly thrown up into the Air, at a Distance all the South Side of the Mountain seem'd in a Flame. The liquid Torrent flow'd out of the new Vent, rolling along the Plain underneath, which is above a Mile long, and near four Miles broad; and in its Way it spread very speedily near a Mile wide; and by the fourth Hour of the Night, it reached the End of the Plain, and to the Foot of the low Hills situate to the South. But as these Hills are rugged with Rocks, the greatest Part of the Torrent ran down the Declivities between these Rocks, and into two Valleys; falling suc-

successively into the other Plain, which forms the Basis of the Mountain; and after uniting there, it divided into four lesser Torrents, one of which stopp'd in the Middle of the Road, a Mile and half distant from the *Torre del Greco*. The second flow'd into a large Valley. The third ended under the *Torre del Greco*, near the Sea; and the fourth at a small Distance from the new Mouth.

The Torrent which flowed into the Valley, ran as far as between the Church of the *Carmelites* and that of *the Souls of Purgatory*, by the 8th Hour on *Tuesday*. The Matter of the Torrent ran like melted Lead: In eight Hours it made four Miles; and consequently, it flowed half a Mile in an Hour: A new and remarkable Circumstance of this Eruption, seeing *Bulifone* thought it very strange, that in the Eruption of 1698. the Torrent had advanced sixty Paces in an Hour; whence he infers, that such great Swiftneſs proceeded from a greater Degree of Liquefaction of the Matter. The Trees, which the Torrent light on in its way, upon the first Touch took Fire, and fell under the Weight of the Matter.

The Torrent which ran behind the Convent of the *Carmelites*, after setting the little Door of the Church on Fire, entered not only therein, but also through the Windows of the Vestry, and into two other Chambers. In the Refectory, it burnt the Windows; and, what is surprising, the Glass Vessels, that stood on the Tables, were melted into a Paste by the violent Heat of the Fire. Sixteen Days afterwards, the Matter continued hot, and was very hard, but it was broke by repeated Blows.

A Piece of Glasſ fasten'd on the Top of a Pole (and thruſt into this Matter) was in four Minutes reduced to a Paſte. Under the Mats of the Torrent were heard frequent Reports, which made the Church ſhake, as if by an Earthquake. Along the whole Surface of the Torrent, there appear'd ſmall Fiſſures, out of which iſſued Smoak, that ſunk of Brimſtone mix'd with Sea-water; yet theſe Exhalations are not poiſonous, but rather a Remedy for ſome Diſeaſes. The Stones round about theſe Fiſſures were obſerved to be covered with ſublimed Salts, the Nature of which I ſhall explain hereafter.

Iron, thruſt into theſe Fiſſures, was taken out moiſt; but upon thruſting in Paper, it was not moiſten'd, but rather ſomewhat harden'd.

At the ſame time when the new Mouth open'd, that on the Summit of the Mountain vomited a vaſt Quantity of burning Matter, which, dividing into Torrents, and ſmall Streams, ran partly towards the *Salvadore*, and partly towards *Ottajano*; and at the ſame time that this Matter iſſued out, red-hot Stones were ſeen to be caſt out of the Mouth, in the miſt of black Smoak, frequent Flaſhes of Lightning and Thunder, all produced by the ſame Matter.

Theſe impetuous Expulſions of Fire continued till *Tueſday*, when the Eruption of the melted Matter, the Flaſhes, and thundering Noiſe, ceaſed; but a ſtrong South-weſt Wind ariſing, the Aſhes were carried in great Quantities to the utmoſt Boundaries of the Kingdom; in ſome Places very fine, in others as coarſe as *Iſchian* Sand: And in the Neighbourhood they not only felt this plentiful Shower of Aſhes,
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but likewise Pieces of Pumice-stones, and other large Stones.

Tuesday Night the Fury of the Mountain began to abate, so that on *Sunday* there was scarce any Flame seen to break out of the upper Mouth; and on *Monday* but little Smoak and Ashes. This Day it began to rain plentifully, which continued to *Tuesday*, and afterwards for many Days: A Circumstance which has constantly happen'd after the Eruptions of Times past.

The Damages done in the Neighbourhood by this Eruption of Fire and Ashes, are incredible. At *Ottajano*, situate between four and a half and five Miles from *Vesuvius*, the Ashes on the Ground were four Palms high. All the Trees were burnt, (or blasted) the People terribly affrighted, and many Houses crush'd by the Weight of the Ashes and Stones that fell.

After the Description of this fiery Eruption, the Academy of Sciences [at *Naples*] thought proper to make an accurate Analysis of the Matter, and of the Salts, that were collected in great Plenty near the above-mentioned Fissures; and, towards the Discovery of the Truth, they effectually made the following Experiments:

EXPERIMENT I.

Some of the Stones of *Vesuvius* being pounded small, and the Loadstone applied to the Powder, some few Particles were attracted by it; and the same Powder, put into *Aqua-fortis*, caused a sensible Effervescence; whence it certainly contains no small Quantity of Iron: Which was also found upon Trial
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in another Eruption by *Tomaso Cornelio*. But for the greater Elucidation of Truth, one of these Stones being applied to the Magnetic Needle, it turned to the Stone; and then carrying it round to the opposite End of the Needle, it immediately turned from it, in the same manner as if Iron was applied near the Compass.

EXPERIMENT II.

The Stones are not all of the same Density or Colour; but various, and of different Ponderosity. Some are composed of real Talc, others full of Marcasites: Some are almost all sulphureous, others nitrofe; some of a grey Colour, others red.

EXPERIMENT III.

The Matter of the Current is spongy at Top, but very dense towards the Bottom; which is a Proof of the Fusibility thereof; whereby the heavier Bodies subsided, and the lighter remained at Top.

EXPERIMENT IV.

After growing hard, it retained part of the Heat above a Month, though unequally: For in the inward Parts, where the Air had not free Access, and the Matter was more compact, the Heat was much stronger than towards the Surface.

EXPERIMENT V.

Twenty Days after the Eruption, in divers Parts of the Mountain, from the Bottom to the Top, there were seen to arise many pernicious Damps,

[*Mofete*] especially from the Cavities, and the Fiffures of former Torrents; as also on the Plain: But none were observed in the Matter of this last Eruption. They iflued out of the Fiffures under the Appearance of a cold Wind, and rofe about three Palms high; then they moved along the Surface of the Ground, and, after a Progreff of fome Paces, difappeared. Animals, which happened to graze where thefe paffed, were all killed thereby; and likewise a *Tereſian* Frier, who inadvertently breathed the Vapour of one of theſe Damps.

EXPERIMENT VI.

Having placed the Barometer in the Vapour, it underwent no Change, but the Thermometer fell fomewhat more or lefs. A lighted Torch, thruſt into them at two Palms from the Ground, was ſoon extinguished by the Action of the Damp.

EXPERIMENT VII.

Theſe Damps grew gradually weaker in their pernicious Effects for above three Months, even to the ſubſequent Autumn; as has been generally found in other former Eruptions, or when they happened to iſſue out of their Vents.

EXPERIMENT VIII.

Concerning the Salts which are generated in Abundance in *Vefuvius*, I have, by Order of the Academy, examined them by accurate Experiments. My Intention was to know, if beſides Salt Ammoniac, there were alſo Sea-Salt, Vitriol, Nitre, or any other

other Salt. I thought there was no better way of proceeding in this Inquiry, than by Crystallization; because it is universally allowed, that Salts in Crystallizing constantly retain one certain and determinate Figure; Sea-Salt concreting into Cubes, Vitriolic Salt into Rhomboidal Parallelepipeds, Alom into Octædrons, and Nitre into Rectangular Prisms on Hexagonal Bases. I imagined, that if the Salt of *Vesuvius* happened to contain any Particles of the Salts above-mentioned, it would discover them after Crystallization. This way of Reasoning was confirm'd by Experiment: For the *Vesuvian* Salt, in Crystallizing, left on the Sides of the Vessels small Parcels of crystallized Salts, which, observed through a Microscope, resembled a Tree with its Branches, on the Ends of which there appeared several Pyramids of an irregular Figure, but very sharp-pointed; and between the Branches there were interspersed in some Places a Group of Prisms, in others some small Cubes: Whence I inferred, that the aforesaid Salt was Ammoniacal, and indeed a genuine and efficacious Salt Ammoniac, with insensible Portions of Nitre and Sea-Salt. Which coincides with the Sentiments of the Royal Academy of *Paris* in 1705; with those of *Thomas Cornelius* in his *Progymnasma de Sensibus*; of *Dominicus Gulielmini* in his *Treatise de Salibus*; of *Dr. Boerhaave* in his *Chemistry*, and many other Writers.

EXPERIMENT IX.

In order to be convinced whether this Salt was really Ammoniacal, and of the Nature of neutral Salts, I mixed it with Spirit of Vitriol, and Spirit

of Salt, without producing the least Fermentation. I afterwards put some of it into Oil of Tartar *per Deliquium*, and could not perceive any Ebullition; wherefore it is to be ranked among the neutral Salts.

EXPERIMENT X.

Thrown upon red Coals, it did not crepitate like Sea-Salt, but it boiled and swelled, and after evaporating it dried up.

EXPERIMENT XI.

It is of a very pungent Taste, strongly pricking the Tongue, and of a bituminous Smell of Brimstone, which occasions a violent Head-ach by its volatile Texture.

EXPERIMENT XII.

The Salts taken from different Stones are not all of the same Weight or Colour: For some are yellow and unctuous, as if rubbed all round with *Petroleum*: Others are very white, others blackish, and others of other Colours, according to the Stones they adhered to.

EXPERIMENT XIII.

I have likewise found by Experience, that the Salt Ammoniac of *Vesuvius* is much more efficacious than any other Salt known at this Day, in cooling Liquors. Upon dissolving some of it in Water, it makes the Water so cold, that the Sides of the Vessel which contains it, can hardly be touched without Uneasiness, through the excessive Cold.

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E X P E R I M E N T XIV.

Monf. *Geoffroy*, a celebrated Member of the Academy of Sciences, looks on it as a singular Power of common Salt Ammoniac, that being mixed with a certain Quantity of Water, it rendered the Water fo cold, that it made the Spirit of his Thermometer, eighteen Inches high, fall thirty-three Lines. But I have shewn to feveral Persons, that the *Vefuvian* Salt makes the Liquor of a Thermometer, like his, fall four Inches and an half; which is equal to fifty-four Lines. Wherefore the Efficacy of this Salt, in caufing the Fall of the Liquor, exceeds the Efficacy of common Salt Ammoniac by twenty-one Lines.

E X P E R I M E N T XV.

If round a Veffel full of Water cooled with Snow, there be put fome of the Salt of *Vefuvius*, the Water freezes and grows hard in a very little time.

E X P E R I M E N T XVI.

If you put a good Quantity of the Salt of *Vefuvius* into Snow fet round a [Glaſs] Veffel full of Water, and then ſtir the Veffel, the Water contained therein becomes unfit to drink; having acquired a very disagreeable acrid fulphureous Taſte; a manifeſt Sign, that the Salt is divided into ſmall Particles, which paſſing through the inſenſible Pores of the Glaſs, enter into and mix with the Water.

E X P E R I M E N T XVII.

Of all kinds of Salts, this diſſolves in the greateſt Quantity in Water; and perhaps the greater or leſſer
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Diffolubility of a Salt in Water, will be [found] proportional to its greater or lesser Effect in cooling Water.

EXPERIMENT XVIII.

Being put into Brandy, or Oil, besides that very little of it is dissolved, it occasions no Descent of the Liquor in the Thermometer.

EXPERIMENT XIX.

Being mixed with Blood lately drawn from the Vein of a Man, but coagulated after settling, the Blood was thereby dissolved, and continued in that State for the Space of twenty-four Hours.

EXPERIMENT XX.

A Solution [of this Salt] being injected into the Vein of a Dog, first occasioned Tremors, then universal Convulsions, and lastly Death: And four Hours afterwards, having opened the Dog, the Blood, which should have been coagulated, was found fluid, both in the Trunks of the Veins, and at the Ends of the Arteries.

EXPERIMENT XXI.

It has all the Properties of Salt Ammoniac to that Degree, that upon substituting this *Vesuvian* Salt, instead of common Salt Ammoniac, the strongest sort of *Aqua Regia* may be had for dissolving Gold: Which Experiment was made with Success by Mons. *Lemery*, in the Academy of *France*.

E X P E R I M E N T XXII.

If a Lump of the Mineral Matter be reduced to a fine Powder, and attentively viewed through a Microscope, it appears very like the Sand of *Ischia*, and is very proper for Writing-Sand: Whence I conjecture, that that Sand is nothing else, but the [same] Matter for a long time comminuted by the Action of the Sea

E X P E R I M E N T XXIII.

In some of the Stones there appear some few Veins of Gold, in others of Silver, but insensible; and in others, which are very heavy, there is some Antimony.

E X P E R I M E N T XXIV.

A great Dispute arose in the Academy on the Rise of the [*Mofete*] Damps; for what Reason these should be seen only in the old *Strata* of the mineral Substances, and not in the new, where by the Action of the Fire they ought to issue: Which *Phenomenon*, if I am not mistaken, may be accounted for in this manner: As the cooling of the burning Matter began at the Surface, we may think, that the more subtle heterogeneous Particles, upon the closing of the Pores at the Surface, remained in Quantities buried in the lower Parts of the Matter; which, in Process of Time, becoming acutangular and of deleterious Figures, yet cannot offend while imprisoned: But in new Eruptions, wherein the Shocks given to the Matter produce many Fissures, the Damps, meeting with less Resistance there, issue forth: As when the Air is a
long

long time pent up in some Hollow, upon giving it Vent, it generally comes out in a pernicious Vapour.

EXPERIMENT XXV.

It was observed, that the greatest Shocks happened to such things as stood exposed to the *Volcano*; but that those things which were not thus exposed to it, received but faint Shocks: A manifest Sign, that the Vibration of the Air had a great Share in the Shocks of the Earth: Which Circumstance is taken Notice of by *Borelli* with respect to Mount *Ætna*.

II. *An Abstract of a Letter from an English Gentleman at Naples to his Friend in London, containing an Account of the Eruption of Mount Vesuvius, May 18. and the following Days, 1737. N. S.*

SIR, Dated *Naples, Aug. 30. 1737. N. S.*

YOU have laid a very hard Task upon me, to send you an Account of the late Eruption. **

I was lodged for some time at *Chaja*, and afterwards at *Fontina Medina*, in the Face of this surprising Neighbour [Mount *Vesuvius*], which from thence doth not appear to be above two or three Miles distant.

It gave us Strangers constant Entertainment, by shewing us what it could do, as well as great Satisfaction to the People of *Naples*, who, whilst it continues burning more or less without ceasing, are under
no